



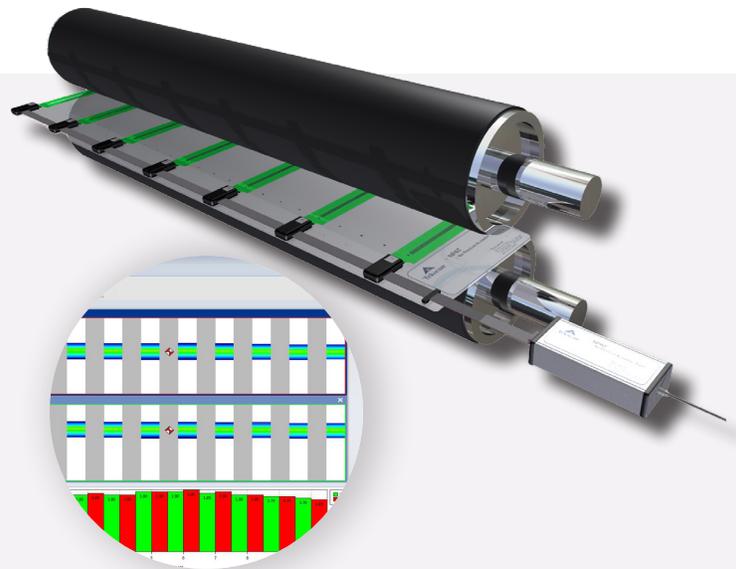
Nip Pressure Alignment Tool™

Measure Nip Width & Relative Pressure Distribution

The Nip Pressure Alignment Tool™ (NPAT™) is a system used to capture nip footprints and relative pressure distribution between nip rolls. The system utilizes a sensor made up of an array of multiple thin and flexible pressure sensitive bands, which can be configured to different lengths to create a sensor that matches the size of a custom application. The real-time data provided by the NPAT ensures machine setup and proper roll uniformity resulting in a better printing process.

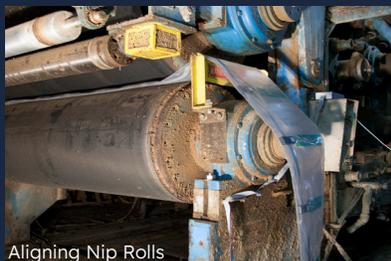
Key Features & Benefits

- Capture visual representation of real-time relative pressure distribution, nip contact, nip width/length, and cross width
- Ensures proper machine setup to prevent equipment damage, improve yield, and reduce waste
- Provides quantifiable and credible data
- Easily maintained in-field



Applications

- **Machine Setup**
 - Preventive Maintenance
 - Roll Uniformity
 - Crowns
 - Diameter variations due to roller wear
- **Deflections**
- **Machine Comparison**



Aligning Nip Rolls

Industries

- Paper
- Iron and Steel
- Packaging
- Film
- Printing
- Die Press
- Converting
- Coaters
- Laminators
- Pull Rolls



Paper Mill

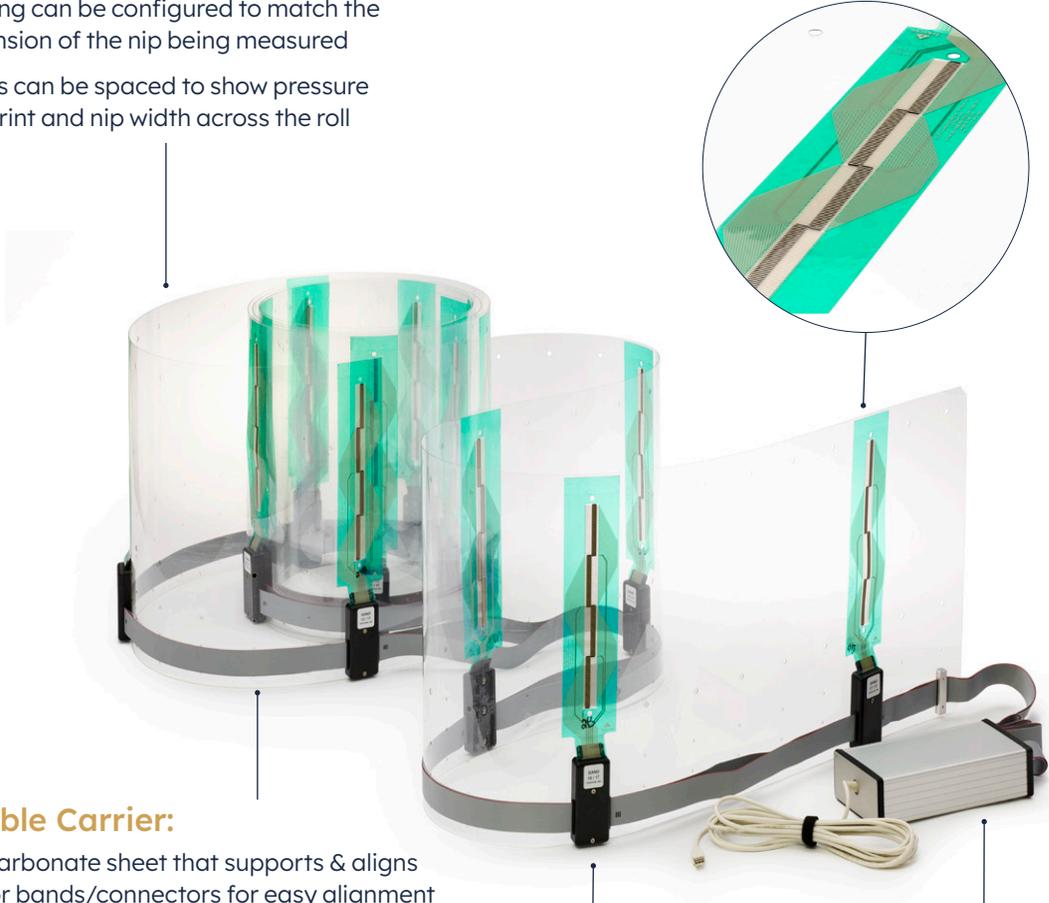
NPAT System Components

Factory Configurable Sensor:

- Large sensor (up to 10 m in length) with multiple sensor bands whose length and spacing can be configured to match the dimension of the nip being measured
- Bands can be spaced to show pressure footprint and nip width across the roll

Sensor Band:

- 3 sensor model resolutions to support different nip sizes
- Standard band measures pressures from 25- 4,500 psi (172- 31,026 kPa). Also available in custom pressure ranges measuring up to 7,500 psi (51,711 kPa)

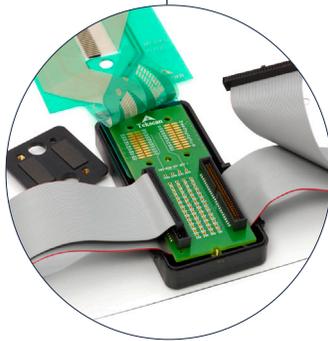


Portable Carrier:

- Polycarbonate sheet that supports & aligns sensor bands/connectors for easy alignment when taking measurements
- Easily rolled up for storage and lays flat when unrolled
- Includes a removable plastic sleeve that protects from wet environments

Rugged Electronics:

- Single set of electronics covering a large area
- Connected to a standard Evolution handle; 1 USB connection to PC
- Protected by ruggedized enclosure



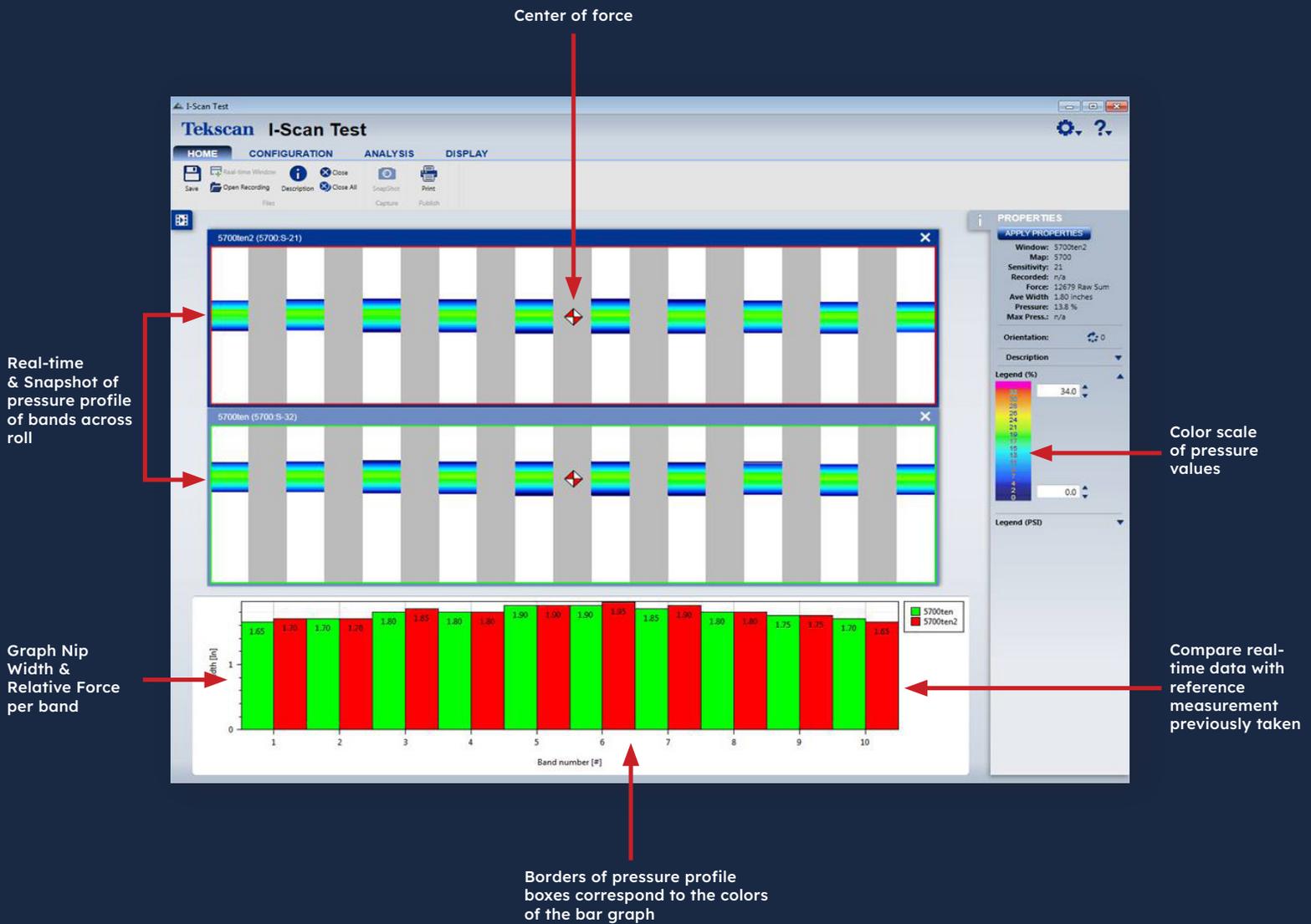
Sensor Band Interconnect:

- Bands are easily replaced and can be serviced in-field

I-Scan™ Test Software

- Software includes force/length units and graph features which easily display nip data by band
- Includes basic features to capture average nip width, relative pressure distribution, and nip uniformity
- Software can save a snapshot of nip uniformity, which can be used as a “gold standard” reference image next to real-time data
- Provides a clear visual representation of pressure distribution, center of force across the sensor, nip contact footprint width and cross width (pressure across each band)
- The various configurations of NPAT sensors offer different lengths and total spacing between bands.

Analysis Tools



System Specifications

Performance Specifications		Mechanical Specifications	
Measured Pressure Range	5700/5707: 25 - 4,500 psi (172 - 31,026 kPa) 5705: 10 - 1,500 psi (69 - 10,342 kPa)	Sensor Band Thickness	0.2 mm (0.008")
Non-Linearity	5705: 10 - 1,500 psi (69 - 10,342 kPa)	Sensor Material	Polyester
Hysteresis	< 4.5% of full scale	Carrier Sheet Thickness	0.8 mm (0.030")
Repeatability	<± 3.5%	Carrier Sheet Material	Polycarbonate
Operation	Piezoresistive Array	Protective Sleeve Thickness	0.3 mm (0.012")
Nip Width	*5700 Sensor: 223.5 mm (8.80") **5705 Sensor: 44.5 mm (1.75") ***5707 Sensor: 201.2 mm (7.92")	Protective Sleeve Material	Polyethylene
Nip Width Resolution	5700/5705 Sensor: 1.3 mm (0.05") 5707 Sensor: 1.5 mm (0.06")	Assembled Sensor Thickness	1.0 mm (0.038")
Sensing Length	See Selection Table	Assembled Sensor Thickness with Protective Sleeve	1.3 mm (0.050")
Peak Pressure	> 2,500 psi (17,237 kPa)	Ribbon Cable Material	Vinyl
Lag Time	5 µsec		

* 5700 Sensing Band (1 column per band; MAX 13 bands/13 columns) is used to make sensors between 457.2 mm (18") and 6,400.8 mm (252").

** 5705 Sensing Band (5 columns per band; MAX 13 bands /65 columns) is used to make sensors between 355.6 mm (14") and 1,625.6 mm (64").

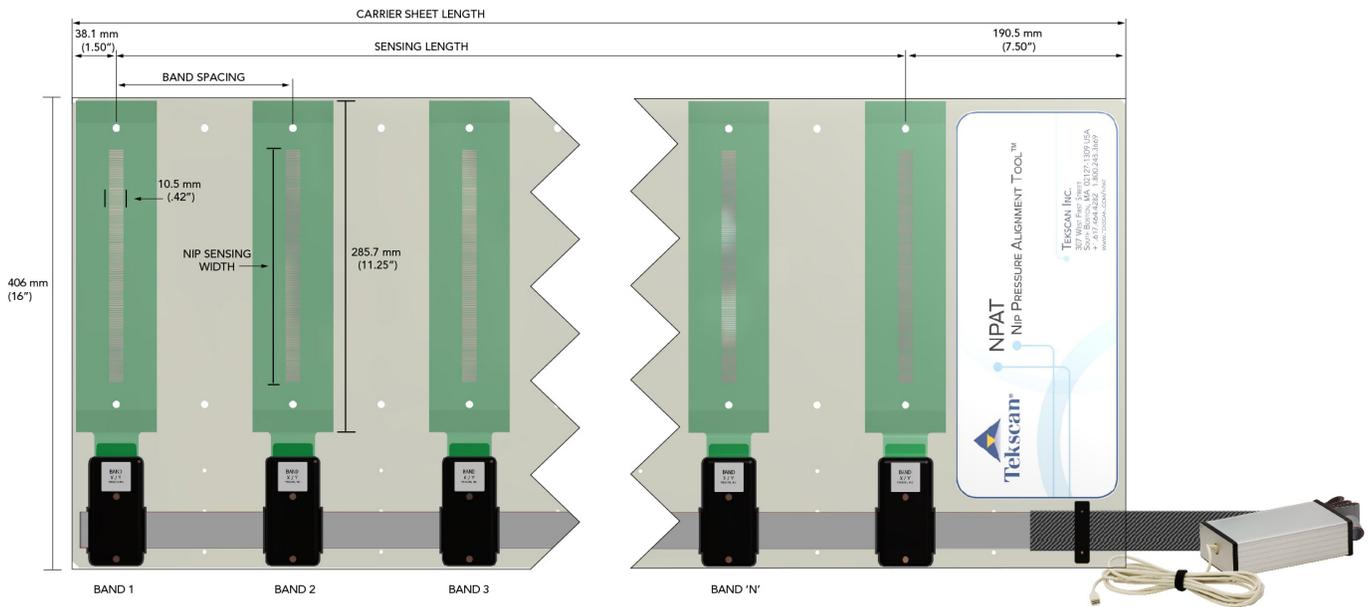
*** 5707 Sensing Band (1 column per band; MAX 17 bands/17 columns) is used to make sensors between 1,524 mm (60") and 10,000 mm (396").

Operating Conditions		Storage Conditions		Communication Specifications	
Temperature, Operating	-20° to 35°C (-4° to 95°F)	Temperature, Operating	-30° to 60°C (-22° to 140°F)	PC Connection	USB 2.0, 480 Mbps
Relative Humidity (%)	5 to 90 (Non-condensing)	Relative Humidity (%)	5 to 90 (Non-condensing)	Scan Speed for Real-time Display	40 Hz

Product Selection

Sensor Type	Sensing Length	Carrier Sheet Length	# of Sensor Bands (Columns)	Sensor Column Spacing	Nip Resolution	Nip Sensing Width	System Number
5700	4,570 mm (180")	4,800 mm (189")	13 (13)	380 mm (15")	1.3 mm (0.05")	223.5 mm (8.80")	NER5700-1500-13B180
	1,830 mm (72")	2,057 mm (81")	13 (13)	150 mm (6")			NER5700-1500-13B72
	1,830 mm (72")	2,057 mm (81")	7 (7)	305 mm (12")			NER5700-1500-7B72
	6,400 mm (252")	6,629 mm (261")	13 (13)	530 mm (21")			NER-5700-1500-13B252
5707	6,100 mm (240")	6,324 mm (249")	17 (17)	380 mm (15")	1.5 mm (0.06")	201.2 mm (7.92")	NER5707-1500-17B240
	9,750 mm (384")	9,982 mm (393")	17 (17)	610 mm (24")			NER5707-1500-17B384
5705	1,625 mm (64")	1,651 mm (65")	13 (65)	25.4 mm (1")	1.3 mm (0.05")	44.5 mm (1.75")	NER5705-500-13B64
	1,371 mm (54")	1,397 mm (55")	11 (55)	25.4 mm (1")			NER5705-500-11B54
	990 mm (39")	1,016 mm (40")	8 (40)	25.4 mm (1")			NER5705-500-8B39

System Configuration: 5700 and 5707 Sensors

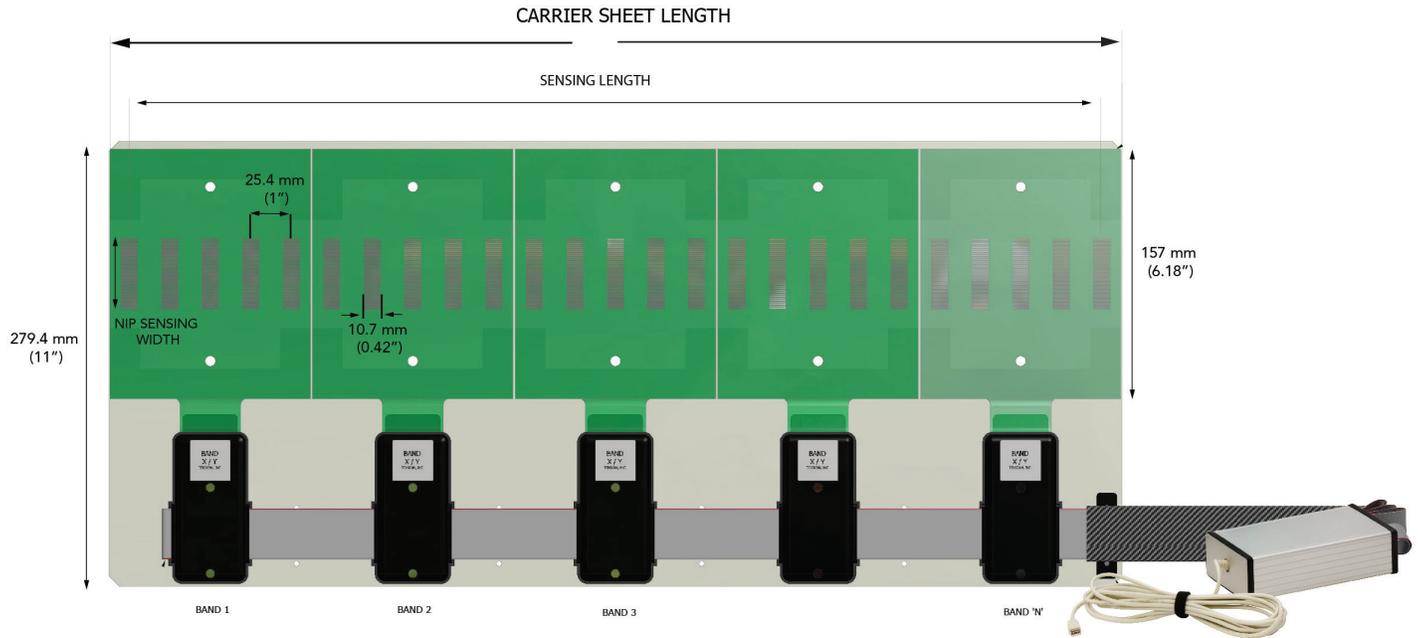


Sensor Band Specifications

Sensor Band Type	5700	5707
Nip Length	457.2 mm (18") - 6,400.8 mm (252")	1,524 mm (60") - 10,000 mm (396")
Nip Sensing Width	223.5 mm (8.80")	201.2 mm (7.92")
Nip Sensing Resolution	1.3 mm (0.05")	1.5 mm (0.06")
# of Sensing Rows in Nip Width	176	132
Max # of Sensor Bands (Columns)	13 (13)	17 (17)
Measured Pressure Range	25 - 4,500 psi (172 - 31,026 kPa)	25 - 4,500 psi (172 - 31,026 kPa)
Sensor Band Model	5700-1500	5707-1500

Also available in custom pressure ranges measuring up to 7,500 psi (51,711 kPa)

System Configuration: 5705 Sensor



Sensor Band Specifications

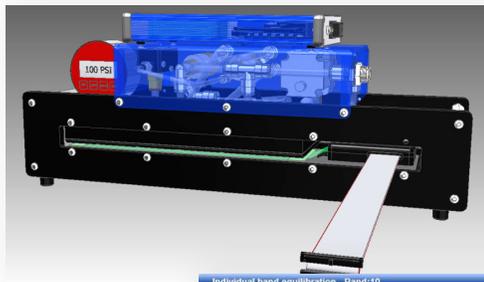
Sensor Band Type	5705
Nip Length	355.6 mm (14") - 1625.6 mm (64")
Nip Sensing Width	44.5 mm (1.75")
Nip Sensing Resolution	1.3 mm (0.05")
# of Sensing Rows in Nip Width	35
Max # of Sensor Bands (Columns)	13 (65)
Measured Pressure Range	10 - 1,500 psi (69 - 10,342 kPa)
Sensor Band Model	5705-500

Equilibration

Equilibration improves accuracy and extends sensor life by verifying that all 2,000 sensing elements have similar output under the same load. To equilibrate, each sensor band of the NPAT is fed into the equilibrator one band at a time. The software uses a Wizard to help users through this step-by-step process. The software controls the pressure via an analog controller to verify a repeatable load is being placed on each sensor (30-60-90%).

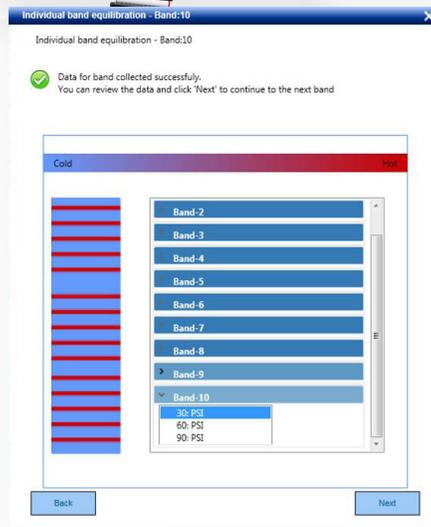
The software detects whether or not the process was done correctly and provides feedback. Once all the bands are loaded, the software applies equilibration factors to all of the sensing elements in the system to improve output uniformity. This process allows the user to identify if a sensor band needs to be replaced.

Equilibrator: PB100NPAT-1



Each sensor band is passed through the equilibrator to normalize output

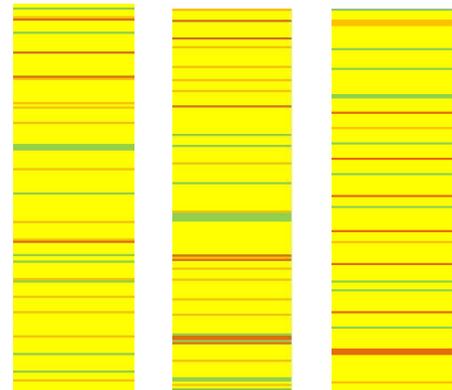
Equilibration Software Wizard



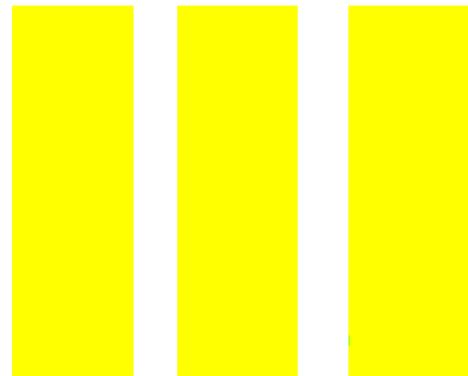
Why Equilibrate?

Over time and through repeated loading, individual pressure sensing elements will start to vary in sensitivity. The equilibrator applies a uniform pressure across the face of the sensor, allowing the software to easily see and quantify these variations.

Sensor in Equilibrator
BEFORE Software Equilibration is Performed



Sensor in Equilibrator
AFTER Software Equilibration is Performed



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